SIPHONAPTERA FROM CENTRAL AMERICA AND MEXICO
A MORPHOLOGICAL STUDY OF THE AEDEAGUS, WITH DESCRIPTIONS OF NEW GENERA AND SPECIES

BY

ROBERT TRAUB

B. S., College of the City of New York, 1938
M. S., Cornell University, 1939

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN
ENTOMOLOGY IN THE GRADUATE SCHOOL OF
THE UNIVERSITY OF ILLINOIS, 1947

URBANA, ILLINOIS
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Despite many recent contributions broadening our understanding of the Order Siphonaptera, there are certain phases which have received little emphasis, and there are also gaps in our knowledge.

Thus, from the standpoint of serving as an aid in systematics, the aedeagus has received little attention. Another example of how little we know about fleas is the fact that the Siphonapteran fauna of certain large geographical areas is still virtually unknown.

This work may serve as an introduction to the flea fauna of Central America and Mexico. Two new genera and 25 new species and subspecies are described, and the genera *Jellisonia* Traub 1944 and *Pleochaetis* Jordan 1933 are revised. Keys to the species of those two genera are included. The aedeagus is described for each new species, and characters are noted which are considered of generic and specific value. A comparative study of the aedeagus of each of 26 genera, representing five families, is presented. The aedeagus of 52 species and subspecies are figured.

Minchin (1915) published a somewhat detailed account of the aedeagus of *Nosopsyllus fasciatus* (Bosc.). Pavlovsky (1926) described certain generic differences in six species of fleas. Jordan (1939) in a paper on the classification of *Rhopalopsyllus* Baker not only described but figured the highly

modified aedeagus in this complex of genera. Wagner (1940) used part of the aedeagus to aid in classifying Old World species of *Ctenophthalmus* Kolenati. Sharif (1945) made a very detailed study of the aedeagus of *Ctenocephalides felis* (Bouche). Snodgrass (1946), whose terminology I follow, described the aedeagus for nine genera of North American fleas.

The following genera are discussed:

I. Family Hystrichopsyllidae

1. *Corrodopsylla* Wagner 1929.
2. *Doratopsylla* Jordan and Rothschild 1912.
3. *Hystrichopsylla* Taschenberg 1880.
4. *Leptopsylla* Jordan and Rothschild 1911.
5. *Stenoponia* Jordan and Rothschild 1911.
6. *Strepsylla* genus nov.

II. Family Ceratophyllidae

1. *Ceratophyllus* Curtis 1829.
2. *Ctenophthalmus* Kolenati 1856.
3. *Dasypsyllus* Baker 1905.
4. *Diamanus* Jordan 1933.
5. *Foxella* Wagner 1929.
6. *Jellisonia* Traub 1944.
7. *Kohlsia* gen. nov.
8. *Nosopsyllus* Jordan 1933.
9. *Opisodasys* Jordan 1933.
10. *Orchopeas* Jordan 1933.
11. *Pleochaetis* Jordan 1933.
12. *Polygenis* Jordan 1939.

III. Family Ischnopsyllidae

1. *Myodopsylla* Jordon and Rothschild 1911.
2. *Sternopsylla* Jordan and Rothschild 1921.

IV. Family Pulicidae

1. *Ctenocephalides* Stiles and Collins.
2. *Hoplopsyllus* Baker 1905.
3. *Pulex* L. 1758.
4. *Xenopsylla* Glinkiewicz 1907.

V. Family Hectopsyllidae

1. *Echidnophaga* Olliff 1886.
2. *Tunga* Jarocki 1838.

On the basis of aedeagal and other characters, *Ctenophthalmus* shows more affinities with the Hystrichopsyllids than with the Ceratophyllids. *Leptopsylla*, on the other hand, is believed to be a Ceratophyllid flea, not a Hystrichopsyllid.

Hystrichopsyllid fleas such as *Hystrichopsylla* and *Stenoponia*, for example, are frequently considered primitive. It is therefore interesting to note some generalizations about the aedeagus of these and other Hystrichopsyllid genera discussed.

In both *Stenoponia* and *Hystrichopsylla* specialized lobes such as the median dorsal lobe and lateral lobes are absent. Instead, the end chamber is covered by a simple hood open apically and ventrally. The pair of sclerites, here called the apical sclerites of the inner tube, is present in both genera and may also be primitive. The two genera

also have very long aedeagal apodemes. These genera, and the other Hystrichopsyllid genera cited, agree in the following: Crochets short or relatively short, neither very much longer than broad nor extending far from endchamber. Aedeagal pouch relatively very long, arising well proximad of apodemal strut, with lateroventral margins usually well sclerotized, probably open ventrally for the most part. Third apodemal rod arising from aedeagal pouch wall or lying free in pouch; not arising from ninth sternum. Sclerotic inner tube without armature or feebly armed; usually horizontal; with apex simple. Apical appendage absent. Proximal spur usually not apparent.

Certain generalizations can be made about the aedeagus of the genera of Ceratophyllidae studied. The aedeagal pouch is relatively short and its extent usually marked by the proximal spur. Lateroventral margins of pouch are sometimes sclerotized. The endchamber is covered by the long lateral lobes which are usually convex and extend from near pouch wall to near apex of median dorsal lobe. Lateral lobes variable in shape; at times fused with wall of aedeagal pouch or reduced. Crochets very large; extending distad of endchamber and with articulation permitting much freedom of movement. Median dorsal lobe often single and simple, but at times highly modified. Sclerotic inner tube short, usually vertical, with lateral and/or apical armature usually specialized. Third apodemal rod arising from angle of ninth sternum; not aedeagal in origin. *Leptopsylla* has an aedeagus of this type and is considered by me to belong to this family rather than to the Hystrichopsyllidae.

Genera such as *Polygenis* are quite distinct from other Ceratophyllid genera with respect to the morphology of the aedeagus. The intra-aedeagal penis rods, the hood flaps, the vesicle, the elongate sclerotic inner tube of two sclerites, the heel, the crochet processes are all distinctive. The modifications of the aedeagus support the contention of most workers that *Rhopalopsyllus* s.lat. and its allies, should be put in a separate subfamily.

The two bat fleas (Ischnopsyllidae) discussed have a type of aedeagus suggestive of that of the Ceratophyllidae. The proximal spur is well sclerotized. The crochets are very large, extending distad of the endchamber and freely movable. The third apodemal rod arises from the angle of the ninth sternum instead of from the aedeagus.

The genera of Pulicidae studied have certain characteristics in common which are worthy of note. The endchamber is lengthened considerably - the distances proximad and apicad of apodemal strut are usually subequal. The floor of the endchamber is usually broad and strengthened with thickened lateral runners. The runners terminate in distinct sclerites termed the pseudocrochets. The true crochets are reduced or absent. Even when well developed, the crochets project only slightly from the endchamber. The lateral lobes are apical in position and short. The proximal spur not apparent. Apical appendage absent. Often with dorsal curved strengthening processes called ribs. Median dorsal lobe often expanded dorsad and frequently with subdorsal sclerites, which may or may not be associated with inner tube.

The inner tube is horizontal, elongate, usually of two distinct sclerites, relatively unarmored, with a distinct vesicle, which is a dilated subspherical structure ventrad to the base of the inner tube and in which elements of the penis rods and ventral intramural rod enter. The third apodemal rod, aedeagal in origin, but apparently also associated with elements of the ninth sternum.

The differences between the aedeagus of *Echidnophaga* and that of *Tunga* are so great that it is idle to try to make any generalizations, even though both genera are placed in the Hectopsyllidae. The aedeagus of *Echidnophaga* resembles that of the Pulicidae. That of *Tunga* is extremely specialized and needs further study. It is remarkable for the extreme length of the two-segmented sclerotized inner tube.

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VITA

Robert Traub was born in New York City on 26 October 1916. He graduated from George Washington High School in that city in January 1934 and received the Bachelor of Science degree from the College of the City of New York in January 1938 after majoring in Biology and Education. He entered Cornell University in 1938 on a scholarship and received the Master of Science degree there in 1939 after majoring in Medical Entomology. He then served as half-time assistant at the University of Illinois for the academic years 1939-1942, with a major in Entomology and minors in Helminthology and Zoology. The intervening summers were spent as instructor in Biology at the College of the City of New York and as parasitologist with the Fourth Hoogstraal Mexican Expedition.

He was commissioned in the Sanitary Corps of the Army of the United States in June 1942 and saw principal service as malariologist and entomologist in India, with the U. S. A. Typhus Commission in Burma, and at the Army Medical Center in Washington, D.C. Since he was commissioned as entomologist with the Regular Army in 1946, his duty station has been the Army Medical Center.

He is a member of Phi Beta Kappa, Sigma Xi, the Entomological Society of America, the American Association of Economic Entomologists, the American Society of Parasitologists, the Helminthological Society of Washington, the Entomological Society of Washington, and the American Mosquito Control Association.

He has published the following papers:

1944. New North American Fleas. Zoological Series of Field Museum 29 (15): 211-220

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